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Modifications of this system will occur to every one. Dr. Gemminger uses a syringe for the extraction of the contents as well as for the inflation of the emptied skin. For an oven, the Vienna entomologists employ an ordinary gas-chimney open at both ends and inserted in a sand bath, which prevents perhaps the danger of too great heat.

NOTES ON THE CYPRINOIDS OF CENTRAL NEW JERSEY.

BY CHARLES C. ABBOTT, M. D.

The family of fishes known scientifically as the Cyprinidæ, and popularly as "shiners" and "minnows," is well represented in the Delaware river and its tributaries. A careful study of the several species of cyprinoids found in the immediate vicinity of Trenton, N. J., convinces us how difficult it is to define clearly the distinctive characters of many of these fishes, even with a very large number of specimens to guide us; the tendency to vary in color and fin arrangement being especially noticeable. Therefore, while we have ventured to describe, as new to science, a small cyprinoid, collected by us, for the first time, during the season of 1873, we have purposely confined our notes to the species gathered here in large numbers, and not included in several small collections received from other portions of the state. While, therefore, we propose to give the full list of species, found in but a small fraction of the state's territory, we believe it really presents the entire cyprinoidal fauna of the state.

In his admirable synopsis,* Prof. Cope mentions twelve species, of six genera, belonging to the Delaware and its tributaries. The study of the material at our command enables us to recognize, without difficulty, all of these as described and figured in the synopsis referred to; but there is also, it must be mentioned, many specimens that we have considered as species, as defined by Prof. Cope, in which variations exist, that are of sufficient importance, it would seem, to make them even more than marked varieties—

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* Synopsis of the Cyprinidæ of Pennsylvania: Transactions of American Philos. Soc., vol. xiii.

varieties that, seen from an evolution standpoint, are well advanced to that point, where the "species" commences and the "variety" ends. To some of these instances, we will call particular attention elsewhere, and remark here that, besides the twelve species given by Cope, there are included four well marked species, of genera not included in the list referred to, being *Hybognathus** Agassiz, *Albernellus* Girard, and *Hyborhynchus* Agassiz, these making the number of genera, nine, that are represented in the Delaware fauna.

So far as our investigations have enabled us to determine, the cyprinoids of the Delaware River, at the head of tide water, and in the neighboring streams, are as follows: —

1. *Semotilus rhotheus* Cope. "Chub." This is our largest and, in the river, our most abundant species. Although the males, in spring, are then most highly colored, they do not become at any season dull or leaden tinted. We have noticed that the variety of tints and general ruddy tinge of the whole fish vary considerably, in different streams; the milky, turbid waters of clay creeks appearing to have the effect of keeping down the rich colors that make this fish so beautiful from March to June, when found in the river or clear spring brooks. Some peculiarities of its coloring fade almost immediately, and others change in hue, on taking the fish from the water. The first published† description of this fish, detailed the colors of a living specimen, which accounts, we suppose, for the difference in the general appearance as given by us, and as noticed by Prof. Cope, ‡ when examining dead specimens. The largest specimen we have met with weighed 1 lb. 14 oz.

2. *Semotilus corporalis* (Mitchill). This "chub" is also an inhabitant of several little brooks, sometimes reaching considerable size, but never attaining the dimensions of *S. rhotheus*. As we have often noticed with reference to allied species of fishes, so in this instance; we do not find them *i. e.*, the two species of *Semotilus* associated in small streams, nor intimately so, in the river. Besides the marked difference in color, the smaller scales at once make evident the great difference between this and the preceding; which is much more nearly allied to the northern *Semotilus argenteus* Putnam (*Leucosomus pulchellus* Girard, *et auct.*) "In Gun-

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* Synopsis of fishes of North Carolina: Proc. Amer. Philos. Soc., vol. ii, p. 466.

† Proc. Acad. Nat. Sci., Phila., 1861, p. 154. ‡ l. c. p. 564.

ther's Catalogue of Fishes," vol. vii, we find a specimen recorded, of *S. rhotheus*, from the Delaware River; and considered the same as *Semotilus argenteus* Putnam. As the specimen is marked "Adult," it seems strange such an error should have occurred.

3. *Rhinichthys nasutus* (Ayres). Both from the limited number of streams, in which it is found, and from the few individuals which occur, this is preëminently our rarest species.

4. *Rhinichthys atronasus* (Mitchill). "Dace." There are but few streams, except in the northern portion of the state, where this pretty species may be found. Generally, we have met with it, associated with the young *Semotilus corporalis*, and both it and the latter were remarkably successful in escaping from a scoop-net, by *burrowing* under stones, with all the ease of a *Melanura* in the soft mud; or else by leaping several inches from the water, and so passing over the rim of the net.

5. *Stilbe Americana* (Linnè). "Roach." DeKay has described as two generically distinct fishes,* under the names of "Variegated Bream" *Abramis versicolor*, and "New York Shiner" *Stilbe chrysoleucas*, the cyprinoid designated above as *Stilbe Americana*. The two varieties, which are not simply varieties in color, are now conceded to be the same species, and it seems strange that DeKay should have considered these variations of more than specific value, when now it is not accorded even that importance. On studying the descriptions and figures above referred to, and instituting a comparison of these with a very large number of specimens of this fish, we have satisfied ourselves that there exists a well marked tendency to vary in this fish, which verges nearly to that line, beyond which a variety becomes technically a species. DeKay's figure, on plate 29, is an excellent representation of the common "roach," as we find it in quiet waters and the larger streams of this state. Color, which properly goes for but little, in the study of the specific differences of fishes, merits more attention in this case, from the fact that there is not any decided deepening of, or variation in, the tints, in the spring or nuptial dress, as compared with that of autumn or winter. In the case of DeKay's description of *Abramis versicolor*, we have a gaudy species described, which suggests at once a fish taken in early spring, when the cyprinoids, as a class, are in brightest colors; such however is not the case with the *Stilbe Americana*, as when we

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*Fishes of N. Y., p. 191, pl. 32, fig. 103; p. 204, pl. 29, fig. 91.

examine the figure of *Abramis versicolor*, we find a fish varying in the size and shape of its fins also.

In studying the very large collection of specimens of the "roach," from streams of different character, made during the past summer, we think we have traced a uniform variation in the size and shape of the fins, more especially of the dorsal and ventrals; and with it, a constant difference of the color of the *Stilbes* taken in small, rapidly running streams, and the ordinary "roach" of our mill-ponds and quiet creeks. These differences, in some respects, agree with the distinctions drawn by DeKay between the *Stilbe chrysoleucas* and *Abramis versicolor*, but not in all. Indeed, we have never met with a "roach" that was strictly identical with the fish described by DeKay as a "variegated bream."

The variations we have traced out in a large series, and which we believe to be constant, are as follows :—

Delaware River specimens.	*Shabbaconk Creek specimens.*
Adult, total length,[*] 7½ in.	Adult (?), total length 5 in.
Dorsal fin, depressed, reaching to the point opposite the 9th ray of anal fin.	Dorsal fin, depressed, reaching to a point opposite the last ray of anal fin.
Ventral fins, depressed, reaching to a point, separated by two scales from the anus.	Ventral fins, depressed, reaching to the anus.
Mouth, when closed, on a line drawn through the pupil.	Mouth more oblique; when closed, the front of the lips on a line with the upper edge of the orbit.
Scales with 7 to 12 radii.	Scales with 4 to 5 radii.
Color as described by DeKay and Storer. Ventral fins crimson on anterior rays, fading into orange. Other fins lemon yellow, with black lines on the dorsal and caudal fins.	Color uniformly blue, with no shade of green or golden; lighter on belly, but scarcely silvery. Fins pale yellow, but at no time crimson or golden.

In order not to mislead the student, it must be clearly understood, that while the specimens of *Stilbe* from the Shabbaconk Creek are uniformly different, as here pointed out, we do find "river" specimens, which are partially grown individuals of the typical *Stilbe Americana*, that in some respects approach closely to the variety characteristic of the Shabbaconk and other clay creeks. But the variations we have described cannot be ascribed simply to age, especially the uniform blue color of clay creek individuals.

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[*] In the 4th vol. NATURALIST we have referred to the fact of having gathered many specimens, eight and nine inches long. Compared with the whole number of individuals in any given stream, these measurements are exceptional, and the length above given is about that of the average adult fish.

Do we not here have an instance of adaptation to particular localities; even to the change of color? It has often been asserted that we never see a species undergoing a radical change; but is not this an instance of such change, one possibly now of "specific" value, as a "species" was once considered? The color of the waters, in bulk, is bluish; and it has occurred to us that the blue color of these clay-creek roach may have been created or evolved, for their better protection from our ravenous kingfishers (*Ceryle alcyon*), who swallow them without any preliminary carving, as they are said *not to do*,* in other sections of the country. We have noticed, in fact, that this fish is a favorite prey of the kingfisher; and as each species of fish appears to have its own peculiar odor, when alive, we have thought that this fish was through its odor (and flavor?) attractive to this bird; and when inhabiting shallow streams, and so exposed the more to its attacks, how natural to see, in the changed color, a means of protection as an offset, as it were, to its attractions in odor and flavor.

6. *Hypsilepis cornutus* (Mitchill). "Red-fin." Our "red-fin" appears to be in all respects identical with the New England fish, as figured by Dr. Storer.† Young specimens are much less robust than the figure referred to, but the variations we have noticed, in examining a large series, appear to be all due to age.

Besides the deeper coloring and numerous tubercles upon the snout, the males of this species vary from the females in a stouter body and somewhat more elevated dorsal outline; features which are permanent and uniform.

7. *Hypsilepis analostanus* (Girard). "Silver-fin." This beautiful little fish is a constant companion of the preceding species. A partial study of its habits, by means of the aquarium, has demonstrated, however, that it is a more carnivorous fish, and not only were specimens noticed to tear away the fins of each other and of

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* NATURALIST for Oct. 1873, p. 634. (Mr. Breed here refers to a note in "Nature' and not the NATURALIST, as printed.)

† Fishes of Mass., p. 118, pl. xxi, fig. 3.

other cyprinoids, but larger ones even killed and devoured adult specimens of *Hybopsis bifrenatus*.

8. *Clinostomus funduloides* Girard. We have, during the past summer, met with single specimens of this last mentioned cyprinoid, associated with other small fishes, on several occasions. They are identical with specimens in the Museum of the Academy of Sciences, at Philadelphia; marked by Prof. Cope, from tributaries of the Susquehanna River, Penn.

9. *Hybopsis bifrenatus* Cope. "Minnow." This little fish, characterized by an imperfect lateral line, and deep straw color and black markings, is probably our most abundant species of this genus.

10. *Hybopsis chalybœus* Cope. "Minnow." This species, which much resembles the preceding, has a complete lateral line. It is not uncommon, and usually met with, associated with the other small *Hybopses*.

11. *Hybopsis procne* Cope. "Minnow." To quote Prof. Cope, "This small species may be readily distinguished among others common in our streams, by its long caudal peduncle and tail, its large brown-edged dorsal scales and plumbeous lateral band."

The first mentioned of these three species of *Hybopsis* is everywhere, in New Jersey, exceedingly abundant, and supplies the carnivorous fishes with an unfailing supply of food. In a collection of *Hybopses* before us, we find the three species represented in the following proportion, and believe this to be about their relative abundance in the Delaware and tributaries, at this point.

Whole number of specimens, 123.

Of *H. bifrenatus*, ...	75	specimens.
" " *chalabœus*, ...	22	"
" " *procne*, ...	26	"

In identifying the above series of small minnows, we have been guided solely by Cope's synopsis, to which we have so frequently referred. While we believe we are correct in our identifications of the three species, we must here mention that there were some individuals of this series (and it holds good of every collection we have made, of small *Hybopses*) which we found it difficult to determine, as to their specific relations, that were in fact neither *bifrenatus* nor *chalybœus*, and, as we believe, not the young of other fishes. In a series of a thousand individuals, one will be pretty sure of finding intermediate forms, which link these three *Hybopses* very closely. This presence of intermediate forms is not confined, however, to these small minnows. In every large collection of cyprinoids we have yet made, there occurred some individuals, that varied in one or more directions from typical forms, and yet not in such a manner as to indicate probably permanent specific or generic peculiarities.

12. *Hybopsis Hudsonius* (Clinton). "Spawn eater." This interesting cyprinoid is exceedingly abundant in the several tributaries of the Delaware River. The several published figures of the species are characteristic; both those of DeWitt Clinton,* who first described this fish, and that given by DeKay,† are quite accurate, and give the best representations of it we have seen. Prof. Cope's‡ figure of "*Hybopsis Hudsonius*" we believe to be that of the following species, as will appear. At all events, it is a much more marked variety of the true *Hudsonius*, than the small blue *Stilbe* we have described is of the typical *S. Americana.* Of the true *H. Hudsonius*, DeKay writes: "It is called "spawn-eater," from an idea entertained by fishermen that it lives exclusively on the spawn of other fishes." This belief has no doubt arisen from the fact of its having a "sucker"-like habit of feeling carefully over the bottom of the stream with its peculiar "telescopic" mouth extended, and so sucking up such food as it finds to its liking. The examination of the stomachs of many specimens shows that, like the *Stilbe Americana*, it feeds very largely on small mollusca, that cover every stone and other stationary object in the beds of our streams. We do not think the charge of spawn-eating can be laid to this fish with more reason than to all the other cyprinoids. Indeed, without an exception, the ova of all other fishes are, to every species of fish, a luscious morsel; and we are inclined to think that many fish are so far *unnatural* (?) as to devour the newly-laid ova of their own kind.

The very blunt snout, almost at right angles with the forehead, gives this fish an abrupt profile, which, especially when living fish are compared, is a ready method of distinguishing this species from the closely allied *Hybopsis phaënna* Cope, with its more tapered, regular profile.

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* Annals Lyceum of Nat. History of N. Y. Vol. 1, p. 49, pl. 2, fig. 2.

† Fishes of New York, p. 206, pl. xxxiv, fig. 109.

‡ Synopsis of Cyprinidæ of Penn. Pl. xii, fig. 3. (Trans. Am. Phil. Soc., Vol. 13.)

13. *Hybopsis phaënna* Cope. Prof. Cope* has described the cyprinoid here referred to as a distinct form of *Hybopsis*, having received specimens, collected by the writer, in 1864. He says, "*Hybopsis phaënna* is a species, found in some of the tributaries of the Delaware, which I have received from Trenton, N. J., from my friend Charles C. Abbott. It is more elongate in form than *H. Hudsonius* and *H. Storerianus*, and has not the rounded front of the first or small compressed head of the last. Eye a little less than one-third length of head; latter $5\frac{1}{3}$ times to concavity of tail, and more than equal greatest depth of body. . . . . . Angle of mouth not posterior to anterior nostril. Scales $\frac{5}{4}$, 38. Lateral line very slightly deflected opposite the dorsal fin. Base of caudal to posterior edge of dorsal, equal from latter to beginning of the skin of the head. D. 1–8; C. 19; V. 1–8; B. 1–9; P. 15; Length 4 inches."

The differences between the two, *H. Hudsonius* and *H. phaënna*, which are quite uniform and readily noticed in living specimens, are as follows:

Hybopsis Hudsonius.	*Hybopsis phaënna.*
Snout blunt. Angular in profile.	Snout tapering. Curved in profile.
Diameter of orbit less than length of snout.	Diameter of orbit more than length of snout.
Anal fin, depressed, reaches to the anus.	Ventral fin, depressed, does not reach the anus.
Bright silvery stripe along the lateral line, golden posteriorly, and uniform olive-green from dorsal stripe to lateral line.	Plumbeous stripe along the lateral line; and four narrow blue lines between the dorsal stripe and lateral line.

Prof. Cope, in his monograph of Pennsylvania cyprinoids, says "There may still be some question as to the pertinence of this specimen (from the Delaware, at Trenton, N. J.) to *H. Hudsonius*," he having referred it to that species then, and subsequently. Were there no specimens of the cyprinoid found in the Delaware that were precisely such as described by De Witt Clinton, then it might be thought that the *H. phaënna* was simply a modified form of that species; but the two being associated, each preserving the distinctive features, as pointed out by us, with the non-occurrence of individuals, that by less pronounced features link the two, leaves little ground for doubting their being really, specifically distinct. It should be remembered, also, that the *H. phaënna* reaches a larger size than the *H. Hudsonius*, here in the Delaware, and the "more conic form" of the snout cannot be ascribed to maturer age, as has been done by Prof. Cope. Specimens three and four inches long are in every respect like Clinton's figure of *H. Hudsonius*, while specimens of *phaënna*, five and five and a half inches long, have the tapering profile, much as in the drawing given by Prof. Cope, and above referred to. In conclusion, we must add that, in the figure given by Clinton, the circular black spot at the base of the caudal is a very marked feature. Cope says in his description, "no spot at base of tail." Now we believe the truth to be, that the *H. phaënna* is also to be recognized by the absence of the caudal spot, which we have never failed to note on typical specimens of the *H. Hudsonius*.

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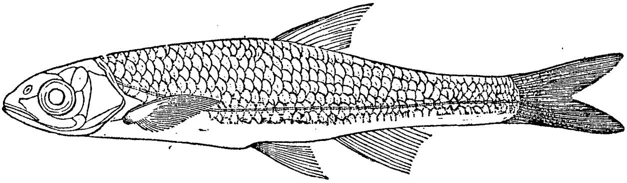
* Proc. Acad. Nat. Sci. Philad. 1864, p. 279.

14. *Alburnellus amœnus* Abbott. The discovery of this beautiful cyprinoid makes the second instance of a genus being represented in the Delaware and Ohio rivers, and not in the intermediate river system of the Susquehanna. It was first met with, by the writer, in the summit level of the Delaware and Raritan canal, associated with *Hybopsis Hudsonius*, *H. phaënna*, *Hypsilepis analostanus* and *Hy. cornutus*.

Fig. 78.



Alburnus amœnus. Natural size.

We give the following description of the species with a figure* (Fig. 78). Head shorter and broader than Alburnelli generally; with the profile less pointed anteriorly to the orbit. Orbit large, equal to length of the muzzle, and entering length of head 3·25 times; but a trace less than the interorbital space. Head 4·25 times in length to basis of caudal; greatest depth, four and two-thirds ($4\frac{2}{3}$) times to same.

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*The figure was engraved without correction of the drawing on the block and is not accurate in its details.—Eds.

Pharyngeal teeth 1,4—4,1; moderately hooked, and with a narrow masticatory surface, more noticeable on one specimen examined than on the other. The single tooth of the series is in all respects similar to the others, but only half the size. Occasionally the series is 2,4—4,2, as in *Alburnellus rubrifrons* Cope. Anterior ray of dorsal slightly posterior to the insertion of the last rays of ventrals. The anterior ray equals in length the posterior margin (terminal) of the fin. Terminal ray slightly in advance of the anterior ray of anal fin. Anal fin broad, the base equalling the length of the anterior ray. Terminal margin of the fin slightly concave in outline. The pectoral fins terminate at a distance of three scales' width from the insertion of the ventrals. Terminal margin of the ventrals opposite fifth ray of the dorsal.

Lateral line decurved from the upper angle of the opercular apparatus, and continues in a slightly oblique direction to some distance beyond the dorsal fin, and *not rising again opposite that fin and continuing straight to the caudal fin*, as in *Alburnus rubellus* Agassiz. D. 1-8; A. 1-11. Scales 5-39-3. Total length, 3½ inches. Color, pale olive above, with minute black dots on the exposed edges of the scales. A bright silvery band three scales wide at the operculum, and narrowing to a width of one and one-half scales at the base of the caudal fin. Operculum and iris pure silvery. Belly white, but not with a metallic gloss.

The specimens taken were collected late in August, and the colors noted while they were in an aquarium. At present they are rare, both in the river and its several tributaries, and we are confident that we have never seen them previous to last summer, although accustomed carefully to collect and study our various small fishes for the past dozen years; and from the fact of finding it only in the canal, which has an unobstructed outlet into the Raritan River, 25 miles east of the Delaware, it may be that the fish in question is properly a species belonging to that river. It was in this stream that the following species was first met with, in 1870; and now, as will appear, it is a very abundant species in some of the Delaware tributaries; probably derived from the Raritan River, through the communication opened by the canal referred to.

15. *Hybognathus osmerinus* Cope. This very interesting species was discovered by the writer, associated with our common smelt or "frost fish" (*Osmerus viridescens* Mitchill) from the Raritan River, at New Brunswick, N. J. It was first described by Prof.

Cope,* from a specimen we sent him, and has since been figured by the writer.† During the interval, from the time of first detecting this peculiar species until the present summer, we have never met with even a single specimen; the few small fishes supposed to be this species, and referred to by us, in the 4th vol. of the NATURALIST, proving to have been young of other fish, and had we properly studied at the time the anatomy, instead of relying upon the external appearances, such an error would not have occurred. The statement *then* made, however, is *now* correct; for the abundance of this species in some localities is very remarkable.

During the present summer, Prof. A. C. Apgar and the writer fished, with a large seine made of mosquito netting, a pond formed by the united waters of a large spring and the inflowing current of the Delaware and Raritan Canal. To our surprise we found the cyprinoidal fauna to consist wholly of this species, associated with the "roach" and the three small "minnows," *Hybopses*. We procured over one hundred specimens, and from them note the following with respect to their size and appearance. The adult size is probably five inches; the largest specimen taken by us measuring within a small fraction of that length. The orbit, which, both in the drawing given by us, as above referred to, and in that given by Girard of *H. argyritis*, in the tenth vol. Pacific R. R. Survey, is oval, is in the adult living fish, nearly, if not quite circular, and less oval in the young living fish, than represented. After long immersion in spirits, we notice that the eye is oval, rather than circular. Otherwise, externally, we note no variation from Prof. Cope's description. It is given, by Prof. Cope, that the length of the intestinal canal, which is a generic character, is, in *Hybognathus*, four times the length of the fish. On careful measurement of the intestines, in over fifty dissections, we find the length, in *Hybognathus osmerinus*, *to vary with age*, and that it is never less than five and one-quarter times the total length. This is a considerable difference, even in fish measuring only three inches in length. Unlike the fourteen other cyprinoids found in the same streams, the peritoneum in this species is uniformly and intensely black. Examination of the contents of the intestines showed an exclusively vegetable diet, which was indicated by the peculiar character of the pharyngeal teeth — without hooks and cultriform — and length of the intestinal canal; it being, as a rule, longer than the total length of the fish, sometimes many times longer, in the herbivorous; and as long, or less than twice as long, in the carnivorous and omnivorous species.

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* Proc. Amer. Phil. Soc., vol. 11, p. 466 (foot note).

† AMER. NATURALIST, vol. 4, p. 717.

The preferred haunts of this cyprinoid are still waters, with muddy and weed-grown banks and bottom. If undisturbed it lies quietly in the growth along the banks, or in the bed of the stream, and only leaves its hiding place when frightened. It is a sluggish fish, compared with some species, but in the aquarium is active enough, to make it desirable.

16. *Hyborhynchus notatus* (Rafinesque). Among the many hundreds of specimens of our cyprinoids, gathered during the present summer, occurred one solitary individual, that in the aquarium was particularly noticeable for his very blunt snout, small, *inferior* mouth, and the fact of the osseus dorsal ray being separated from the adjoining ray by a membrane. These facts indicated its genus as *Hyborhynchus;* and the length of the alimentary canal, and character of the pharyngeal teeth, showed, on dissection, that the external characters had not been misinterpreted. On careful comparison of this single specimen with Gunther's description* and the figure given by Prof. Cope,† we find that it agrees very nearly with the *Hybor. notatus*, from northern and western rivers. The only differences we could detect were a somewhat larger eye, possibly a more tapering snout, and no trace of a black spot at the base of the tail. Experience in the study of this family of fishes shows that these may all be merely individual differences.

The specimen taken was captured, associated with the foregoing *Hybognathus*, and was placed in the aquarium as such; but the differences were very noticeable when the two species were seen together moving slowly about the plants in the tanks and nibbling at the foliage with their peculiar mouths.

Having completed the list of our cyprinoids, we will, in conclusion, give it a moment's consideration from an evolution standpoint. With no faith in the immutability of specific or generic forms, it at once occurs to us that the list might be properly curtailed by considering as merely "varieties," the *Hybopsis phaënna*, *i. e.*, a variety of *H. Hudsonius;* that possibly the three small

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* Catalogue of Fishes, vol. vii, p. 182.

† Penn. Cyprinidæ, pl. xiii, fig. 5.

Hybopses are not as widely different as supposed; and that the *Hybognathus osmerinus* is, in truth, not "specifically" distinct from the allied *argyritis;* that, in fact, it would be more consistent to consider these all, as we did the small blue *Stilbe* of our clay creeks.

If, by a "species," we meant anything other than a convenient arrangement of the various forms of animal life for purposes of study, or saw in the "species" of cyprinoids anything but so many varied forms which natural selection has evolved from some primitive form of omnivorous fresh-water fish, that has given rise to a variety of forms, through a long series of generations, that would, each in its own place and time, suit the particular haunts it chanced to frequent or was forced to occupy; if we have any other thought in view, then, it would be grossly inconsistent to add to the long list of so-called "species." We do not, however, consider "species" otherwise than as here sketched out, and considering also the amount of variation among any considerable number of individuals of any one "species," and believing that varieties are steadily though slowly becoming more and more varied, and so gradually entering what may be termed "specific territory," we claim that no undue use of the imagination will be brought into play, in recalling a primitive, typical cyprinoid, when we range, side by side, adult and young specimens of each of even the sixteen "species," that we have met with so far, in the Delaware River and its tributaries, in central New Jersey.

THE MIGRATION OF BIRDS.

BY T. MARTIN TRIPPE.

THERE is nothing connected with the fascinating study of ornithology that possesses a greater attraction than the migrations of birds. There is so much of the mysterious in their coming and going and we know so little of the manner in which their journeys are performed, that our very ignorance lends an additional charm to the mysterious interest involved. Anemones and buttercups spring up in a day, where yesterday they were not; but ere they come, we might have found the sprouting blades and tender buds